and two of the others, of the University of Cambridge, one has been honoured by both Oxford and Cambridge degrees. Where is the "excessive representation of one great academical institution" among these gentlemen? Undoubtedly one of the English Universities has a large share; but, if the author of the "Criticism" imagines that the influence of that University, or of any member of it acting on behalf of his University, had anything whatever to do with the election of these officers to the posts they hold, it is simply because he is utterly unacquainted with the circumstances under which these appointments were made; and more especially with the difficulty of finding competent men who are able and willing to devote an immense amount of time and trouble to the affairs of the Society.

So with respect to the "reappearance" of similar names on the Council "every five or six years." If the critic had ever taken part in the business of selecting a new Council; or even if it had occurred to his somewhat captious mind (1) that all branches of science must be represented; (2) that men who can and will give a great deal of time to the service of the Society are alone useful; (3) that it is not everybody's business to be a useful councillor; (4) that people who live far out of London, as a rule, find it difficult to attend the frequent meetings of the Council and its committees, he would not have found it necessary to suggest corrupt motives for this fatal reappearance of the same councillors; and that in spite of the rule that a man must be off the Council for a year before he can be re-elected.

It is further made a reproach to the Society that among the yearly elected fifteen "the professor abounds greatly, while independent investigators of the type of Joule, Brewer, Spottiswoode, De la Rue, Darwin, Gassiot, Grove, and others who have been the glory of English science, are comparatively rare." To which singular statement (most singular perhaps in the collocation of names) it would seem necessary to reply only by putting two questions. Will the critic point to any man ranking even with the least known of those whom he mentions, now living, who is not in the Royal Society, or who has not been placed on the Council, except of his own choice, or from the accidents of residence and occupation? And, secondly, has it occurred to him that in the last quarter of a century, a multitude of new professoriates in science have been created, and have been filled by the best workers the appointers could find? And if these gentlemen have not left off working the moment they were made professors, does it not seem probable that the Council of the Royal Society may have had even better grounds for selecting them for the fellowship than their appointers had for making them professors?

Finally, the "Criticism" affirms that "eminent professors may be named who are also eminent improvers of natural knowledge, yet are not fellows of the Royal Society."

We venture respectfully, but firmly, to question the accuracy of this statement; unless these "eminent improvers of natural knowledge" have voluntarily abstained from seeking the fellowship. It is not for the Council to ask any one, however "eminent," to join the Society. And if there are persons who have been glad to accept honours from the Royal Society's hands, but who have chosen to abstain from taking the steps which would, as a matter of course, have placed them in its ranks and have enabled them to take their fair share in the burden of its work; no one but themselves is responsible for their singular position—the Royal Society *farà da se*, and does not require their aid.

THE ELEMENTS OF PHYSIOLOGY.

Elements of Human Physiology. By E. H. Starling, M.D. Lond. (London: Churchill, 1892.)

If this book is intended as an introduction to the physiology a medical student ought to acquire it will fill its purpose admirably, but it would be too much to say that it could in any way take the place of the larger text-books. Such a book as this, rightly bearing the word "elements" in its title, if used, as it should be, as a "guide," will give the student an acquaintance with the subject which will be an excellent introduction to more detailed works. Dr. Starling has written in some 400 small 8vo pages a concentrated account of the physiological processes of the body. The knowledge given is fully up to date. It must have been a difficult task to do this in so small a space without merely recording a succession of disconnected facts and rival theories. Dr. Starling is to be congratulated on having accomplished this task well. The judicious selection he has made of the really important points, and his terse and clear mode of expression has enabled him to produce a book which besides being instructive is interesting, which with a condensed manual is seldom the case. The danger of the book lies in its excellence. If a student, a medical student aiming at a mere qualification trusts, with the aid of some histology, to this book alone, he may doubtless accomplish his immediate object. But who would then be satisfied that he possessed a knowledge of physiology such as a medical man should be equipped with? If the student could not merely learn, but also assimilate all that is brought before him here, his mind would not only be supplied with much information, but also receive a useful training. The experience of teachers, however, is that the average student does not understand the intricacies of many of the processes and mechanisms of the animal body by having them tersely expounded to him in a few sentences. He may learn those sentences, but his ignorance is at once exposed if he is brought face to face with the same question along another path. The more a medical man knows of what physiology can teach him of those portions of the science which come into the most intimate relation with medical practice, all the better. The danger is that when this book falls into the hand of the student he will be satisfied, and refrain from consulting fuller works or even from practical laboratory work, on the importance of which the author in the preface so rightly insists.

The introduction gives not only an account of the general properties of living matter, but also a rapid survey of the build and functions of the animal body, touching even on development. This is followed by an account of the chemical constituents, and as this must be largely referred to by the student during the reading of the book, it is a necessity, but would, I think, have been better placed at the end.

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In the chapter on blood and lymph a fuller account of leucocytes with their varieties and functions, and especially of the proteid and other substances associated with them, would certainly have been desirable. It is of course easy, in reviewing so small a book, to find instances of curtailment and of omission, but the life history of the leucocytes is of supreme importance medically, that even the account of the derivatives of hæmoglobin might, for their sake, have been shortened.

The phenomena of muscular contraction are well described, and the account of muscle and nerve currents is especially clear and to the point.

In the chapter on the vascular mechanism two tracings of pressure in an artificial schema are taken from Prof. Foster's text-book. The tracings are accurately reproduced. In the description of these we are told that, after a high peripheral resistance is introduced into the circuit, "the pressure on the arterial side at first rises with every beat till it has attained a certain height, where it remains stationary, merely oscillating with every stroke of the pump. The venous manometer, on the other hand, shows no rise of pressure, and its oscillations becomes less and less, till they disappear and the flow becomes continuous." A glance at the tracing shows, however, that there is a rise of pressure on the venous side, and moreover a maintained rise. This is a very important point about the tracing. A student grasps readily the action of the arterial blood pressure in forcing the blood from the aorta to the capillaries, but he is at a loss to understand why it comes back again from the capillaries towards the heart. It cannot be too much insisted on that we have a pressure, a small and gradually falling pressure, in the veins, and that this is the important determining cause of the venous flow. The author, in this the proper place to bring this prominently forward, leaves it out entirely, though it is incidentally referred to later on, and leads the student to suppose that the presence of the valves in the veins and the aspiration of the thoracic movements, important though they may be, are the chief factors.

The subject of endocardial pressure and of the pulse is treated, clearly and concisely, in the light of Hürthle's important work. This is particularly welcome, as, if I am not mistaken, this is the first occasion that these researches have been brought before English readers.

In the discussion of the causation of the heart's beat it does not seem clear why "the beat always starts in the sinus" when we are told that the sinus contracts feebly and slowly. The fact that the sinus has a more rapid rhythm than the other chambers of the heart, and so initiates the whole cycle, is not distinctly brought out. The author follows Schmiedeberg's opinion in stating that muscarin acts by stimulating the nerve-endings of the vagus. This is by no means certain, and we should have welcomed some mention of Gaskell's opinion that its action is a direct one on the muscular tissue, and some of the reasons for taking that view. In the description of the vasomotor mechanisms I have found no adequate statement of the important part vaso-dilator nerves play in regulating the circulation in skeletal muscle.

In the account of the nervous mechanism of respiration, which is well up to date, in including some of the results of the work of Head, we should have expected also some statements of Marckwald's observations on the influence of section of the medulla above the respiratory centre. No reference seems to be made of the influence of impulses reaching the respiratory from higher centres of the brain. It is also unfortunate that when the student turns, as directed, to Fig. 61 he finds that the tracing selected of the effect on the respiration of section of the vagi does not show the increase in amplitude as it does the decrease in rate, although he is told that both the changes are brought about. On page 266 there is an obvious misprint; the word "expiratory" should be "respiratory." On page 291 there is another misprint, "B_2" in the equation should be, of course, "Br." A few lines further on there is, however, a serious error. We read, "From the amount of nitrogen given off the amount of urea present in the urine, may be calculated. 35·5 c.c. of nitrogen correspond to one gram of urea." The theoretical amount calculated for one gramme of urea is 372·7 c.c. at standard temperature and pressure, while 35·5, or more exactly 35·4 c.c., is the amount which Hüfner found was actually liberated not by one gramme, but by one decigramme of urea.

The chapters on the special senses and on the central nervous system are some of the best in the book. The methods of tracing fibres in the cord and brain are fully gone into, so also is localization of function, and indeed the account of the brain throughout is very clear and good.

At the end of the book is a short appendix, in which is given a description of apparatus purely physical in nature. Every teacher will agree with the author that it is not only desirable, but necessary, to put this in a manual of physiology. The ignorance of the construction and use of the simplest physical apparatus, which the average medical student carries with him into the physiological laboratory, is usually almost as perfect as it can be. Much of the time of a demonstrator of physiology has at first to be given to the teaching of some of the simplest physical methods.

L. E. S.

APPLIED MECHANICS.

Elementary Manual on Applied Mechanics. By Prof. Jamieson. (London: C. Griffin and Co., Limited, 1892.)

THIS is the latest addition to the series of books introduced by Prof. Jamieson during the last few years. Like his useful work on the Steam Engine, it is the outcome of the course of lectures which he delivers to his own students. It is replete with the many mechanical contrivances to be found in the workshop, one chapter being devoted to the consideration of the screw-cutting lathe alone.

The illustrations, with which the book abounds, and the necessary descriptions of the various machines considered, are all that one may wish for.

An excellent feature of the book will be found in the manner in which, after having enunciated a principle, the author has applied it to some well-chosen examples. In this direction he has proceeded to an extent which will be highly appreciated by the student. Further, he has availed himself of any opportunity to obtain results experimentally, and these form a very instructive series of examples for the young engineer.

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